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Aluminium Houses

The aircraft industry is thoroughly convinced that of all the propositions put forward for temporary accommodation, the aluminium house is unquestionably the best. It has, of course, surmounted far more difficult problems, and it is favoured by possessing unsurpassed manufacturing facilities. Yet all is not well, perhaps because the proposition has been launched as providing employment for a year or two whilst the change from war to peace production is being undertaken. Some within the industry would prefer that consideration be given to manufactures showing promise of being permanent lines of production. Moreover, conditions have been such that much vacillation has been in evidence, due no doubt to the alternation of pressure and slackness in the various departments. For instance, prototype houses have incorporated both wrought and cast window frames. Again, the question as to whether gutters and fall pipes are to be wrought or cast is still undecided. We are assured, however, that a large number of castings are to be incorporated, but neither weight nor number can yet be stated. In these circumstances, the foundry section of the industry must energetically stake its claim. There must be no more of those delays consequent on waiting for the official sanction of the laboratory. Builders' castings do not demand the meticulous inspection to be associated with the motor car, let alone the aircraft industry. Moreover, both cost and speed of production of such castings indicate the desirability of reducing materials inspection to a minimum. The main factors are ease of production by semi-skilled labour and interchangeability.

The industry would do well to follow the lead given by the Institute of British Foundrymen when it undertook to design, equip and put into operation half a dozen foundries for the manufacture of tank track links. In this case the master patterns were made by one concern only, and working patterns supplied to the individual concerns. If, as we are told, the provision of houses is priority number two, now that Japan has replaced Germany in the highest category, then the light alloy foundry interests should get together, appoint one recognised foundry expert, and get busy with the production of master patterns for—and this is important—as many types of castings as possible.

The Aluminium Development Association has a difficult task ahead, but we are convinced that it can establish itself in public esteem very firmly if only it can organise the resources of the industry it serves so as rapidly to produce really serviceable temporary dwellings. When the next phase supervenes, that is the provision of a hundred and one household requisites, the experience gained in the provision of houses on a large scale will be of the utmost value. In the production of normal consumer goods, there is no place for "months on the drawing board," and innumerable detail modifications, and first consideration should be given to speed in manufacture rather than an extensive and never ending search for better and better performance qualities. We were hoping to see something of the progress made towards the provision of "aluminium" houses at the forthcoming exhibition at Selfridges, but we are not too sanguine.

The staff of THE FOUNDRY TRADE JOURNAL is returning to its London office, 49, Wellington Street, Strand, W.C.2, on May 25. As from that date all communications should be addressed to the London office. Telephone: Temple Bar 3951 (Private Exchange). Telegrams: Zacatecas, Rand, London.

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THE LATE MR. JOHN SHAW

A PERSONAL APPRECIATION BY DR. J. E. HURST

After a long period of activity in the foundry industry, John Shaw retired some 18 years ago, in 1927 to be exact, but still kept up his deep interest in ironfounding. For a number of years up to the outbreak of the war he maintained contact with the Institute of British Foundrymen, various committees of the British Cast Iron Research Association, and his many friends both in this country and in America. At the London conference of the Institute in 1929 his presentation of the Report of the Test-bar Committee, a committee of which he had been chairman and convenor since 1922, was followed by his election to honorary life membership of the Institute in 1930/31. At the Manchester conference in 1934 his valuable and spirited contribution to the discussion on the Report of the Cast-iron Sub-committee of the I.B.F. Technical Committee clearly showed that seven years' retirement had not diminished his keen interest in foundry matters.

During the first world war John Shaw was the Controller of Grey-iron Castings at the Ministry of Munitions. The experience he gained then of the many problems in the organisation of casting supplies invoked a deep interest in methods of testing, test-bars and specifications for grey-iron castings, an interest which he never lost. As chairman of the I.B.F. Test-bar Committee formed to assist in the revision of British Specifications for grey-iron castings he played the part of leader in the establishment of the system of relating the size of the cast test-bar to the size of the casting represented, and also in the adoption of the cylindrical test-bar. The report of this committee which he presented in 1922/23 outlined the principles which were ultimately incorporated in the present B.S.I. Specifications. His special work in this field and his long service to the industry were recognised when in 1924 he was awarded the Oliver Stubbs Gold Medal of the Institute. He was elected a member of the I.B.F. in 1906, and became president of the Birmingham branch in 1916/17. On taking up his post with the Brightside Foundry & Engineering Company, Limited, after the last war, he became actively associated with the Sheffield branch, and was elected president of the branch for the year 1920/21. His retirement was marked at the Sheffield conference in 1927 by the presentation of a hall clock subscribed for by members of the Sheffield branch and other members of the Institute. The presentation was made by Mr. V. C. Faulkner, the president of the Institute at that date.

Papers and Lectures

His early Papers were presented to the Birmingham branch. In 1909 he dealt with the subject of moulding sands, and again in 1913/14 session he led a discussion on this same subject. A comparison of British and Continental foundry practice was the title of a lecture delivered in 1910/11 and the relationship between drawing office, patternshop and foundry he discussed in a Paper presented in 1917/18. The subject of physical tests for cast iron was dealt with in a Paper presented to the Coventry branch of those days in the session 1923/24, and a Press article in March, 1930, dealing with the reliability of scleroscope readings on chilled-iron rolls drew attention to a matter of first rate importance to the British roll-making industry.

John Shaw was well known in foundry circles in America. He had many friends there, and the American Foundrymen's Association, of which he was a member, paid tribute to his work and stirling qualities in their award to him of the John A. Penton Gold Medal.

He was very keenly interested in music, and was for many years a choirmaster, and organised and ran a choral society.

In the foundry he was concerned with the production of large and heavy castings. At the Brightside foundry some of the largest and heaviest castings in this country are produced. In this section of the foundry industry perhaps more than any other is that strength of character, knowledge and skill necessary that comes from long experience, constant application and a deep and abiding interest. John Shaw possessed all these qualities. His upright character and boundless energy commanded respect and confidence and endeared him to all who knew him.

ALUMINIUM FOR HOUSES

Sir Stafford Cripps, Minister of Aircraft Production, addressing the Aluminium Development Association recently, spoke of the progress achieved by the industry during the war. Production of magnesium incendiary bomb castings had reached a peak at one time of 4,327,000 a month, and they were all being used. He hoped that much of the scrap and secondary metal that would become available would be absorbed in making houses. The Government welcomed the fact that here was an admirable use for large quantities of secondary metal, and so an order had been placed by Mr. Duncan Sandys for 50,000 houses. He hoped that before the order was completed it would be possible to turn the end of it into an order for permanent, and not temporary, aluminium houses, and so create a market for the industry.

COPPER AND ZINC FOR ANY MANUFACTURE

The Ministry of Supply announces that future applications to the Non-Ferrous Metals Control for licences to acquire copper and zinc for United Kingdom consumption will be considered by the Control without restrictions in respect of the type of article to be manufactured. Certain restrictions on the release of copper and zinc will, however, continue to be imposed as regards export orders.

The statutory provisions regarding the acquisition and disposal of these metals are still in force, and the present procedure of submitting to the Non-Ferrous Metals Control, Grand Hotel, Rugby, schedules of orders with applications for licences must be followed.

THE CARNEGIE LIBRARY, of Pittsburgh, has recently issued a "Review of Iron and Steel Literature for 1944." It has been compiled by Mr. E. H. McClelland, of the technological department, and contains a classified list of the more important books and articles which were published in the year under review.

TECHNICAL CONTROL IN THE JOBBING FOUNDRY*

Influence of one variable factor upon another

By R. D. CHEYNE

The use of technical control in any process of manufacture is only based on investigation as to which is the correct method of procedure. Many foundrymen or engineers may query the statement "the best or correct method of procedure," as there are frequently several different and equally satisfactory methods of carrying out a particular manufacturing operation, *i.e.*, a plane surface on a machine part may be produced either by planing, milling, or by grinding. After investigation, one particular method is found to be the most efficient, and is the one to be adopted. Even in rare cases two alternative methods may prove to be equally satisfactory—one should be selected and the other rejected. The best way is that which gives the minimum waste with the smallest expenditure of labour and capital resources, while maintaining the desired standard of the finished product. The first step in technical control in any foundry is that the plant working conditions, such as heating, ventilation, should be all at their maximum efficiency.

It has often been said that technical control has very little practical application in the jobbing foundry owing to the large variety of castings produced. No doubt in a number of cases the controlling factor at the present moment lies in the skill of both the executives and workers, and will continue to be so for a considerable time, but the days of foundrymen whose sole knowledge is gained from local experience are limited. The largest variable factor in the jobbing foundry over which very little control can be exercised is that of the mass and design of the casting. Nevertheless, as all the other fundamentals that operate in producing a sound casting, *i.e.*, the construction of the mould, moulding materials, the metal used, and its physical properties, are governed by the mass and design of the casting, there should be as little variation in these properties as it is possible to allow. Unfortunately, there are no hard-and-fast rules whereby all these variable factors may be assessed in their true perspective.

Role of the Patternshop

All technical control should start in the patternshop. The patternshop should have a necessary list of plant and equipment that exists in the foundry, and standardisation should be carried out wherever possible. The economies to be made by skilful planning and the fullest and correct use of all plant and equipment can be made in the patternshop.

Before dealing with some practical examples of defects due to these variable factors, it is essential to mention a few fundamental principles which, although elementary, are of vital importance. The following factors seriously influence the structure of any casting:—(*a*) Pouring temperature; (*b*) material from which the mould is made, *i.e.*, dried sand or chilled mould; (*c*) thickness of cross section of metal; and (*d*) chemical analysis.

Analysing these points it is found that a metal absorbs a higher proportion of gases in comparison to its rise in temperature, so that its solvent powers increase with temperature. During solidification it only gives off a certain proportion of these absorbed gases, in accordance with the freezing range of the metal. Given the correct composition, the correct treatment in melting, with due reference to de-oxidation and a properly made mould, one would naturally expect the metal to yield its fullest properties. Expectation is not always realised as is shown by the results in Table I. These tests are all from ordinary grade phosphor bronze, and their analysis in every case is identical—the only variant was in that of the pouring temperature.

TABLE I.—*Physical tests on ordinary grade phosphor bronze at varying casting temperatures.*

	1	2	3	4	5
Maximum stress Tons per sq. in.	19	21	21	22	26
Elongation percentage on 6 ins.	19	25	33	27	50

High-temperature measurement is a comparatively expensive business, but from the results shown it is essential in the majority of cases. The safest method and only accurate method if the pouring temperature is at all critical, is not to use a direct recording instrument, but in preference a potentiometric reading. Where an ordinary moving scale indicator is used, the usual chromel-alumel thermocouple is adequate. Where the temperature is critical, a platinum rhodium thermocouple in a silicon sheath joined to a standard potentiometer can be used. This latter instrument can also be used for standard checking purposes. The time lag on this instrument is very small, and will take a direct reading of 1,400 to 1,300 deg. C. in a matter of 35 sec. after immersion.

The type of material and method from which the mould and cores are made are important, because they determine the rate and system of crystallisation, and also the size of the crystal growth. Not only this, its rigidity and refractory point of the cores and

* A Paper read before the Middlesbrough Branch of the Institute of British Foundrymen.

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mould have a direct bearing on the amount of shrinkage. The cores must be able to collapse during solidification, and after shrinkage is completed the normal laws of contraction and expansion have come into force. The thickness of cross section has a direct bearing on the amount of shrinkage, and the method of gating and feeding must also be taken into account.

Oil Sands

Core-binders in general use may be classified as follows:—(1) Paste binders—such as flour, starch, etc.; (2) colloidal and allied binders—such as clay, etc.; (3) gums and pitches, which include resins, etc. (the resin group is used very little, owing to the high cost), and (4) oils, such as linseed, vegetable and mineral oils. Some of these oils are hazardous owing to the amount of combined water present.

From Table II, taking linseed oil sand core at a ratio of 1:50, and a drying temperature of 450 deg. F., a comparative figure of 1.00 is obtained. From this Table comparative figures can be obtained for the different classes of binders. With an increased baking temperature, higher results are shown. In cases when

TABLE II.—*Comparative value of three different types of core-binders.*

Type of Binder	Drying Temperature deg. F.	Binder and sand Ratio 1 : 50	Binder and sand Ratio + Moulding Sand
Linseed oil ..	450	1 : 00	1 : 11
Proprietary compound	350	0.34	0.41
Molasses ..	350	0.25	0.20

instead of a straight sea-sand mixing, a mixing composed of three parts sea-sand and one part moulding sand, linseed oil and a proprietary brand of core compound, a better comparative figure was given, but in the case of molasses a lower comparative figure was obtained. This indicates that in the mixing of different classes of binders the results must be carefully watched. Another observation from these figures was that the clay content in the moulding sand united with the binder on account of the common binder, namely water.

It appears from these few figures that the coreshop in any type of foundry presents as many difficult problems as that of the jobbing foundry. In estimating on any jobbing castings, the foundryman always considers the amount of core-making as an essential problem. If the coreshop is well equipped and the different core mixings are on a sound and rational basis, the cost will not be of such prime importance. In the past, because these points have not been controlled, the coreshop has been an unnecessarily expensive part of the industry.

Core and Mould Dressings

In the case of core and mould dressings, every foundry has its own methods and mixtures, but here is one interesting case. This occurred on a number of bronze castings when a great deal of scabbing was encountered on the cores. The sand used was a dry sand mixing, with no artificial binders of any description. The core wash was suspected as being defective, and attempt was made using commercial core-coats with very little success. A mixing of plumbago and water was tried, with no binders or gum. The difficulty encountered was unless the mixture was constantly stirred, the plumbago was inclined to settle out, and the resultant coating was either too thick or too thin. It was discovered that if a small amount of industrial methylated spirits was added, approximately ½ pint to 2 galls. of water, the plumbago was held in solution, and would not settle out, nor did it require any mixing or stirring.

Owing to the large number of cores being made, painting by means of a brush was too slow a process, and a normal air paint spray, without an agitator, was obtained. No trouble from spraying every type of mould and core was encountered with this mixing. The skin produced on all types of castings was very satisfactory. The drying time of both cores and moulds was reduced considerably owing to the depth of penetration of the water being very small, and also the methylated spirits acting as a chemical drier.

There are other uses for methylated spirits, such as in the coating of chills and denseners. In several cases pure methylated spirits was sprayed on to the chills, the chills were not warmed, but placed straight in the mould and cast. Any moisture from the atmosphere or from the mould and face of the chill was absorbed, and the chilled face was free from gas packets and blowholes.

Blowholes when present in grey-iron or bronze castings are, in the majority of cases due to the mould, not the metal, unless there is something radically wrong with the melting conditions. This applies to the whole or part of the mould, but the pouring temperature and freezing range of the metal have a large influence on this question. Therefore, sand practice and sand control must necessarily be one of the most important factors of technical control in any foundry. In many cases it has been neglected with disastrous results.

Lastly, the chemical analysis of any metal is equally important because it determines the amount of shrinkage. According to Keep: "The measure of shrinkage in cast iron is practically equivalent to a chemical analysis of the silicon," so that the chemical analysis of any metal will help to determine the pouring temperature. The amount of shrinkage will give a clue to the type of gating and feeding systems required which will, in turn, decide the material and method from which the moulds and cores are to be made. Most metal melted in any foundry is remelted metal, therefore the analysis can never be taken for granted, and a proper system must be instituted for checking all metals and melting conditions. It is apparent from these elementary remarks that metal control is allied

to that of sand control and cannot be separated. True economy in the jobbing foundry can only be obtained under strict technical control, which is a combination of good moulding and metallurgical practice.

The following cases, dealing with defects due to the afore-mentioned factors, are confined to grey-iron and high-duty or alloy cast irons. The solutions are not necessarily the correct ones, but were tried after assessing the various points. The first example was that of a bed casting for a machine tool (see Fig. 1). The casting weighed 3 tons, and had an equal section of 3-4 in. metal throughout. The entire inside was cored with large block cores. The core sand mixing was a sea-sand mixing, using semi-solid oil. This mixture was given additional strength by use of yellow loam, as the cores were fairly large. The addition of yellow loam was also made in the interests of economy. Unfortunately, the results were disastrous. The clay content of the yellow loam in combination with the semi-solid oil gave an excessive dry strength. The cores were too rigid, and did not collapse sufficiently. The result was a large contraction crack from the top to the bottom of the casting, before the casting was extracted from the mould. The obvious solution to this trouble was to alter the mixing of core sand used.

The second attempt at this casting was made by

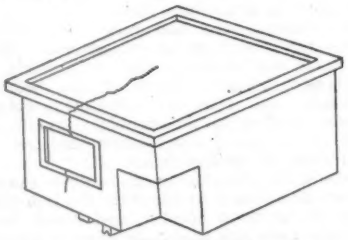

FIG. 1.—CRACKED BED CASTING.

altering the metal mixing and increasing the silicon content from 1.6 to 2.0 per cent. This reduced the amount of shrinkage considerably, but left a small crack across the top of the casting.

The third attempt was made with a new core sand mixing of reduced dry strength, plus the increased silicon content of 2.0 per cent., and no further trouble was encountered. This example was fairly easy to cure, owing to the fault being on the part of the foundry, but in castings where the design is faulty it is much more difficult to cure.

Hydraulic Spindle Casting

The second case of a low carbon iron with a nickel content of approximately 1.5 per cent. on some hydraulic spindle castings (see Fig. 2), the nickel was added to give improved machinability, and the low carbon was obtained by using 50 per cent. steel mix to give a tensile strength of 24 tons per sq. in. The metal section throughout was 3½ in. and a 2-in. cored hole ran throughout the casting, except at the top, where it widened out to 5 in. The feeding head of the casting was a combination of shrinkhead and dress-head, and 8 in. of head was allowed for every 3 ft. in length of the casting. The first castings were made in dry sand moulds, and cast in the vertical position. The core ran through the top runner box, and was surrounded by small pencil runners entering directly into the head of metal; providing hot metal was used and the pencil runners were designed correctly, so that the basin could be choked—the castings were very successful so far as being correctly poured and fed. The composition of the metal was as follows:—T.C,

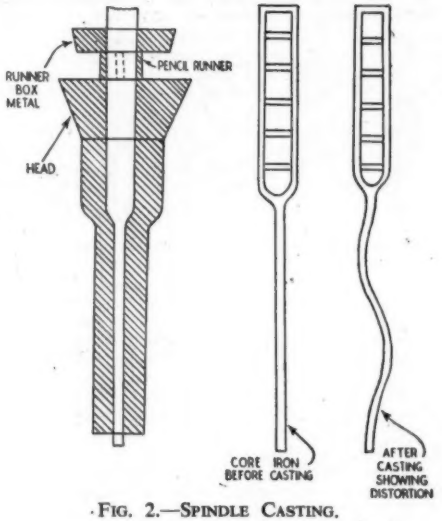

FIG. 2.—SPINDLE CASTING.

2.8; Si, 1.0; P, 0.1; S, 0.1 (maximum); Mn, 0.8, and Ni, 1.5 per cent.

This mixing is melted in an ordinary cupola, using a very high bed charge to obtain an extra amount of superheat. The nickel was charged in ingot form, the first charge having only a very small quantity or none at all, and increased on the subsequent charges. This gave a uniform nickel content throughout the complete metal mixing. The pouring temperature was exceedingly critical, and necessitated the speedy handling of the ladle. The first castings produced were satisfactory in appearance, analysis, and physical tests. On attempting to machine these castings the core could not be removed. One casting was cut in half longitudinally, and it was found that the sand had not stood up to the high temperature, but was a congealed mass of fused metal and sand.

The core iron, which had been fastened at the top and bottom, had distorted badly. This fastening of the core iron had allowed for no expansion of the rod

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which, although made from cast iron, had not broken but simply distorted.

The next castings made had the core fastened at the bottom only, and the sand used was similar to a steelmaker's compo; that is—the silicon content of the sand was increased and the lime content reduced. The most suitable range of casting temperatures for this type of high-duty cast iron is found to be in the region of 1,300 to 1,400 deg. C. The mass and design of these castings was exceptionally heavy. It would have been wrong to lower the pouring temperature to suit the sand conditions, and if the temperature had been lowered or altered in any way, it would have

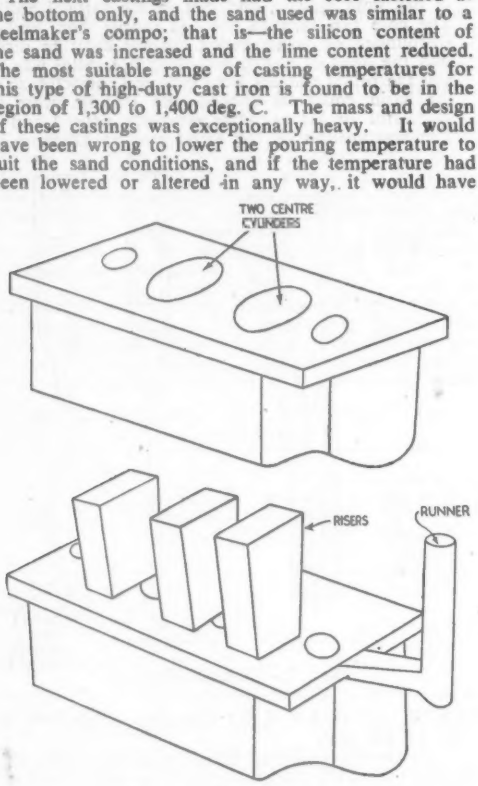

FIG. 3.—VALVE CASTING.

meant a new type of gating and feeding system, while the one already in use had been found correct by practical experiment.

Valve Block Casting

Another case was that of a valve block casting (see Fig. 3) for a machine tool. The metal section was approximately 2 in. through with two centre cores. These two centre holes were machined to take two pistons working at a fairly high oil pressure. All told, there were 64 holes drilled throughout this casting, some connecting the two centre cylinders, and the slightest porosity anywhere within the casting reduced the oil pressure in one cylinder or the other and consequently threw the machine completely out of balance. Many attempts were made to overcome this porosity and shrinkage. Different metal mixings, gating and feeding systems, and also both dry sand and greensand moulds, were tried. As a last resort rod-feeding was tried, but this was not at all satisfactory on account of the equal heavy section throughout.

Finally the method evolved which reduced the scrap to a negligible quantity was first the most suitable composition for the metal. This was standardised at:—T.C, 3 to 3.2 per cent.; Si, 1.2 to 1.4; Mn, 0.8; S, 0.1 (maximum), and P, 0.6 per cent.

This metal was ideal for machining purposes if the silicon content was kept between the units indicated. If it had any tendency to drop below the minimum, an addition of ferro-silicon to the ladle was made before pouring commenced. Three large self-feeding heads, which were approximately equal to the section of metal they had to feed, were placed between the centre holes. The approximate size at the base of these feeding heads was 2½ in. by 1½ in., and they were very similar to the feeding heads used in malleable oil drums. The moulds were made in greensand, but this was partly on account of the lack of drying space. As soon as the metal entered the feeding heads, the ladle was brought over and the risers filled up by pouring direct into them.

The moulding sand had fairly good physical properties, and proved quite satisfactory. The casting temperature was placed as high as possible, even if it meant increasing the height of the bed charge in the cupola, and also the subsequent coke charges. The real solution to this problem lay in meticulous control of the metal composition, and the use of the correct type of feeding heads.

It would be possible to give other examples, but the cases cited serve to illustrate the influence of one variable factor upon another, and it will be apparent from these examples that each stage in the production of a casting contributes towards its ultimate success.

All scrap reports should be very carefully classified, and the main feature of any scrap report should be to draw attention as to the cause of the scrap casting, that is—whether it is due to sand, metal, or other various defects. Wherever possible from these reports, all plant equipment and metal mixings should be standardised as far as possible. Standardisation in the jobbing foundry is only possible to a very small extent as opposed to that of the repetition foundry, but it is well worth using, and is the only sane course to adopt to effect maximum economy.

IT IS INTERESTING TO NOTE that the Wrought Light Alloys Development Association has chosen a casting, that of Eros, as its symbol.

"SIF-TIPS," the house organ of the Suffolk Iron Foundry (1920), Limited, in its winter 1944-45 issue, contains several useful articles, outstanding amongst which is one on the disposal of carbide sludge.

NOTES FROM THE BRANCHES

LONDON.—At the recent annual general meeting, Mr. V. Delport, dealing with a proposal to increase the subscriptions of members of the Institute, and the reasons for it, said the Institute's accounts for the past year showed an excess of income over expenditure of about £400. Although that sounded very nice, it was achieved in a year of record membership; it should also be borne in mind that during the past three or four years the Institute had operated without the full-time services of its general secretary, Mr. Makemson, who was assisting the Iron and Steel Control. Whilst he was still giving much of his time to the work of the Institute, his remuneration from the Institute was very much less than the normal. Further, during the war years the activities of the Institute had been somewhat curtailed; there had been certain enforced economies, one being that conferences were not held on the pre-war scale. Thus, the profit shown by the accounts was due to special circumstances. Emphasising the necessity for looking ahead, he said it was hoped that about a year hence the Institute would be able to resume its full peacetime activities. It would have the full-time services of its general secretary; in addition, printing costs, salaries and everything else had risen. So that the expenditure of the Institute would increase.

The finance committee had considered the matter very seriously; and as a member of that committee, Mr. Delport said that if the Institute were to resume its peacetime activities at the present level of costs, the surplus shown by the accounts last year would probably become a deficit. That was a very serious situation. A joint committee of the finance committee and the executive committee had concluded that it was necessary to increase subscriptions; and at the recent council meeting held in Manchester a recommendation was agreed upon, he believed unanimously, to be put to the annual general meeting of the Institute in June. It was that the subscription for a full member be increased from 2 guineas to 3 guineas, the subscription for an associate member from 1 guinea to £2, and that the subscription for a student member should remain at 10s. 6d. It was desired to achieve unanimity on the matter. Mr. Delport then proposed the following resolution:—"That this meeting, appreciating the need for strengthening the finances of the Institute, pledges its support of the action taken by the general council for this purpose by its proposed increase in subscription rates."

Mr. V. C. Faulkner, seconding the resolution, said that for many years each associate member had cost the Institute more than the subscription of 1 guinea; the result was that the subscribing firms and members had been subsidising the associate member grade. It was felt that the associate members would prefer to pay their fair share; in order that they should do so, the subscription must go up to the suggested figure. He was perfectly sure that nobody wanted to take more out of the Institute than they were putting into it.

Dr. A. B. Everest said that the I.B.F. was more active than other metallurgical institutes and did more for its members; that should be borne in mind when discussing subscriptions. They got much more out of Institute, it held far more meetings, and the work it distributed was very large. The technical council was calling for more assistance, which meant more money; the Institute was hampered all along the line for lack of funds. Therefore, he supported the resolution.

The branch-president added that he would like to be able to say, at the next council meeting, that the resolution was passed unanimously. He had told the councils of other institutes that they were rather dead; the I.B.F., on the other hand, was very much alive. It held its meetings in many places many times a year, and not just once or twice a year.

The resolution was carried unanimously.

WEST RIDING OF YORKSHIRE.—The annual general meeting took place on April 28, at Bradford Technical College. The formal business was dealt with during the afternoon, followed by tea at the College Union by invitation of the retiring president, Mr. J. Blakiston, of Halifax, who, unfortunately, was not able to be present owing to absence abroad. In the evening there was a display of the film "Wartime Calls on Women to make Aluminium Air-cooled Cylinder Heads"; the branch representatives of the past year to the Institute's general council and technical council gave their reports; and Mr. H. Forrest reported on the first year's operation of the "S. W. Wise Memorial Prize Fund."

The hon. secretary, Mr. Douglas Jepson, M.Sc., in his annual report, regretted the absence of the president, but paid tribute to the personality and driving force which had contributed much to the past session being well launched before he left. Mr. J. Timbrell, the senior vice-president, filling the breach, had very ably "skipped" the rest of the journey. The branch had suffered a great loss through the sudden death of their immediate past-president, Mr. Louis Turner, whose efforts had contributed much towards the success of the previous session. The branch also deplored the deaths of Mr. C. D. Wilkinson and Mr. J. E. M. Gess, the latter in a flying accident. The session 1944-45 must rank as one of the most successful in the history of the branch. The lectures had reached a particularly high standard and the attendances constituted something of a record. Works visits had not been practicable, but three were in prospect for the interim period before lectures were resumed. The past session had been memorable also in the raising of the "S. W. Wise Memorial Fund" and the inauguration of the memorial prize competition, the first winners of which were Mr. Wm. Peacock, of Leeds, and Mr. Wm. Jones, of Bradford. Two branch members, Mr. Blakiston and Mr. R. C. Tucker, had been awarded the Institute's Diploma; and two of the younger members, Mr. F. Hallas, of Huddersfield, and Mr. W. Jones, of Bradford, had been invited, out of over 70 applicants, to participate in the deliberations of technical sub-committees of the Institute, in accordance with the scheme evolved and financed by the president, Mr. J. W. Gardom.

Mr. G. W. Nicholls had been co-opted on one of

Notes from the Branches

the technical committees; Mr. Blakiston, in addition to chairmanship of a technical sub-committee, had been elected to the Institute's finance committee; and the branch secretary, Mr. Jepson, had been elected to the education committee of the Institute. With Mr. W. G. Thornton, a member of the literary and awards committee, and Mr. A. S. Worcester on the education committee, both of long standing, it would be realised that, taking into account the various representatives elected annually, the West Riding branch was taking a full share in the activities of the Institute.

Thanks largely to the influence of Mr. Blakiston, the ranks had been swelled by three subscribing firms, 18 associate members and three full members, whilst four former associates had been transferred to full membership. The statement of accounts, also presented by Mr. Jepson, showed a subscription income amounting to over £293, an increase of £17, but there was a corresponding increase in expenditure due to a very active session.

Mr. C. Hall and Mr. F. Squires presented their report as hon. librarians and registrars and appealed for a more prompt and regular return of borrowed books so that they could be more widely circulated, especially for the benefit of the large number of younger members. The meeting subsequently authorised the council to appoint a sub-committee to consider expansion of the library.

Officers elected for the coming year were:—President, Mr. J. Timbrell, of Stanningley; vice-presidents, Mr. Harold Balme and Mr. D. W. Hammond; hon. secretary and treasurer, Mr. Douglas Jepson, M.Sc. (Bradford); hon. auditors, Mr. H. Forrest and Mr. W. G. Thornton; hon. librarians and registrars, Mr. Hall and Mr. Squires; representative on the technical council, Mr. G. W. Nicholls succeeding Mr. S. Carter, with Mr. R. C. Tucker, M.A., as his deputy; delegates to the general council, Mr. W. G. Thornton and Mr. A. S. Worcester; additions to branch council, Mr. R. C. Tucker, Mr. G. Burgess, Mr. Squires and Mr. J. Stott.

WALES AND MONMOUTHSHIRE.—The annual meeting of the branch was held on April 14 at the Engineers' Institute, Cardiff, the president, Mr. H. J. V. Williams, in the chair. Reviewing the past two years in which he had served as branch-president, Mr. Williams referred to the interesting works visits undertaken, and the Papers presented on various subjects. An effort had been made to cater for all branches of the industry, iron, steel and non-ferrous, with a fair measure of success. Weather conditions had caused the postponement of one meeting in January. The February meeting, which was attended by the national president, Mr. J. W. Gardom, and the vice-president, Mr. D. H. Wood, could be looked upon as a success, with an attendance of approximately 70 per cent. of the branch membership. Steady progress had been made in membership. In the period of his office 69 new members had been added, including two subscribing firms, 14 students, 35 associate members and 18 members. Mr. Williams expressed appreciation for the support of the branch council and members, and he looked forward to a progressive growth in interest and membership of the branch. In this direction the establishment of a West Wales section to cater for the Swansea and Llanelly districts would be considered without delay by the branch council.

Officers elected for the ensuing year were:—President, Mr. E. J. Kelly (Pontypridd); first vice-president, Mr. H. W. Thomas (Merthyr); second vice-president, Prof. W. R. D. Jones (Cardiff); branch council members: Mr. T. D. Richards, Mr. Hiram Williams and Mr. A. C. Whiteley (to serve three years); other vacancies due to resignations, Dr. Bryn Jones, Mr. H. Cole and Mr. C. Badcock; delegate to national council, Mr. Wm. Williams; delegate to technical council, Mr. Wm. Williams; auditors, Mr. S. Protheroe and Mr. W. S. Kinsman; hon. secretary, Mr. A. S. Wall.

The auditors' report was presented by Mr. S. Protheroe and approved. Immediately following, Mr. A. Hopwood, of the Lancashire branch, presented a Paper on "Phosphor-bronze Worm-wheel Blanks." The Paper was illustrated by lantern slides and stimulated a lively discussion.

SOUTH AFRICAN.—The February meeting, presided over by Mr. P. L. Ward, listened with considerable interest to a Paper by Mr. W. A. Maclaren on "Plant and Pattern Plate Layout for the Mass Production of Light Castings." After considering the quantities necessary to make the construction of metal pattern plates an economic proposition, the Author next dealt with the moulding box. He expressed a preference for cast-iron box parts, mainly on the ground that the section of the box can be tapered to facilitate the draw, as the taper of the bars and sides resists the upward pressure on the sand when the mould is being poured. The fabricated box having parallel section bars cuts the sand into blocks which are liable to rise whenever pressure is applied giving considerable flash and heavier section than desired. The machining of boxes has not hitherto had the attention in the Union that its importance warrants. It is too often given to the "youngest driller in the shop." After describing the pattern plate equipment design upon which the Author had standardised, he reviewed the actual making of three types of castings. These covered the making of an impeller, a small flanged roller, and a handwheel, of which 36,000 were required.

The discussion was opened by the president (Mr. P. L. Ward), who supported the lecturer's views on moulding boxes. Others taking part were Col. Grose (who was congratulated on his recent promotion), Mr. Bullock, who, in a practical contribution, said he believed that cast-iron boxes suffered from "growth"; Mr. Holdsworth, who scouted the idea of "growth"; Mr. Stones, who preferred the conventional holes for box parts to Mr. Bullock's suggestion of slots; Mr. Watson and Mr. West, who both supported Mr. Stones; and Mr. Tonge, who was convinced that the Union machine shops were quite capable of providing properly machined box parts.

THE IMMERSION THERMOCOUPLE IN THE GREY-IRON FOUNDRY

By R. C. TUCKER, M.A.

Discussion at Bradford on a Paper read before the various Branches of the Institute of British Foundrymen. Mr. J. Blakiston, the Branch-President, occupied the chair. The Paper was printed in our issue of April 26.

MR. J. BLAKISTON (Branch-President), opening the discussion, said that he had heard it stated that a skilled craftsman could judge temperature with some accuracy within 20 to 30 deg. C. (excluding on Monday mornings!). He would like Mr. Tucker to confirm or make observations on that point. He would like to know also whether any precautions were required to be taken before the sheath was immersed, *e.g.*, whether or not it was required to be heated. Mr. Tucker had described the instrument and its operation in a very simple manner, such that any operative in a foundry could understand it—excluding perhaps some of the later data. All operatives would benefit by a knowledge of the instrument, and since the loss of 1 ton represented £30, that led to financial saving.

MR. TUCKER thanked the President for his introduction to the discussion. He had tried to make it simple, as there was an unnecessary fear in the minds of foundrymen that the instrument was complicated and expensive. It was true that the skilled operator could usually judge the temperature to 20 or 30 deg. C. by eye. Skilled operators were, however, dying out, and the men coming in were not such skilled moulders. Ordinary jobbing moulders, who were now frequently piece-workers, were not so interested. The instrument relieved the strain on the eye, and even skilled moulders were affected by "Monday mornings" and by advancing age. With regard to precautions, there were, theoretically, none. There was, however, a tendency to get longer life from a sheath, say 20 heats, by coating with blacking wash or a mixture of alundum cement and blackwash applied as a smooth paste and dried, using a bunsen flame.

MR. H. FORREST (Member) said how much he had enjoyed the Paper by Mr. Tucker, who, fortunately, was one of his colleagues. He knew that the results of the use of the instrument were well worth while. An optical pyrometer was a useful tool where conditions were standard, but he fully endorsed the view that at high temperatures the readings became unreliable. He thought that certain high temperatures quoted had been arrived at, erroneously, by reading optical pyrometers. He agreed that it was necessary to state the instrument used in quoting such figures. Remarkable castings were produced to-day which were better than those of 20 to 50 years ago. In those days, 8 or 10 or 12 tons per sq. in. tensile strength was good enough. Engineers to-day would not take the weight of castings they used to do. High-duty irons had come to the front, and foundry practice had been tightened up, allowing far less latitude in casting temperature and other factors. Wherever possible, one should strive to control every phase of operation. This instrument gave a good idea of foundry trends, and did so quickly. Results were required at the earliest possible moment, for a number of extremely bad castings could be made in a very short time. The nearest one could get to standard conditions, the better, and one must endeavour to control materials from natural sources as closely as possible. Mr. Forrest advised those with any fears of this being a technical subject only, to forget them. On the contrary, it was an intensely practical one, particularly regarding high-duty irons, and led ultimately to financial advantage.

MR. TUCKER thanked Mr. Forrest for his remarks. He agreed that the optical pyrometer was very useful under standard conditions, and the instrument he had detailed did not replace it. Optical pyrometer readings did, however, vary with the operator, and if the skilled operator left, trouble ensued. Moreover, misleading events occurred, such as the running down of batteries. The thermocouple either told the truth or the fault was very obvious. If a small amount of iron penetrated to the couple, alloying with the platinum took place, and much higher readings resulted. Alternatively, the alloy fluxed, and the reading was nil. It was a simple matter then to shorten the couple and proceed, or replace the instrument entirely for the time being. The instrument was also advantageous in case the ladle had a lot of slag on the surface.

MR. H. FORREST added that high-duty low-carbon irons were very sensitive, and allowed no latitude. The desirability of the production of good castings in a short time was appreciated, and the position was that the more one knew, the less chance of failure there was. The more one measured, the more one knew, and this method of temperature measurement was one of the means to this end.

Temperature Variations in Metal Bulk

MR. D. W. HAMMOND (Member) enquired as to whether any variations in temperature had been noted in traversing the ladle, *i.e.*, whether the temperature was greater in the centre than at the edge, which was subjected to transmission of heat. He would also like to know whether any pulsation of readings occurred on the immersion or the withdrawal of the instrument. With regard to general foundry practice, how was the instrument applied when the metal was transported through the foundry, up to, say, 100 yds., to be poured? Should the temperature be taken at the cupola spout or at the casting? What latitude was allowed above the eutectic to ensure freedom from defects?

MR. TUCKER said it was not the function of the instrument to cover the assessment of the proper casting temperature. Every job was a matter of direct assessment—by trial and error if a repetition job; direct if "one off." The instrument provided the accurate record. The determination of the variation in temperature across a ladle had been done only once, and a variation of less than 5 deg. C. had been found. There appeared

to be such movement in the metal that the temperature of the metal was approximately uniform. In the case of a very big mass of metal, that at the bottom was cooler than the last put in, and this should be corrected by "rodding." The depth of immersion was approximately equal to the length of the carbon block, and there was only a minor variation in temperature with depth in that respect.

If the purpose of the temperature measurement were the checking of cupola operations, it would be made at the cupola spout. If, on the other hand, the object were the controlling of the casting temperatures, it would be made at the casting itself. The instrument required only care for its operation, and could be used by the foreman, charge-hand, senior moulder, and so on. Mr. Tucker had not noticed any pulsating of the E.M.F. such as had been suggested. The needle of the meter rose straight up to the temperature and then stopped. Tapping of the glass might be advisable in case of particular hurry.

MR. W. G. THORNTON (Member) said he had no experience with the immersion type of pyrometer, but had found the optical pyrometer to be a really good guide under standard conditions. His experience was that it was always necessary to add 20 deg. to the reading, and to make an allowance for blackout conditions, and for sunlight. He agreed that the instrument used should be stated in publishing results. He asked if the solidus figure could be taken as being invariably between 1,140 deg. C. and 1,150 deg. C. Finally he wished to reiterate his appreciation of the way in which Mr. Tucker had presented his Paper.

MR. TUCKER stated that the solidus varied with the phosphorus content and alloying elements. With manganese and silicon constant, and phosphorus 0.4 per cent., the solidus was very near to 1,130 deg. C., falling by 12 deg. with a phosphorus content of 0.6 per cent. to 0.7 per cent. This was partly owing to phosphide being the last to solidify. He thanked Mr. Thornton for his remarks *re* bringing the subject down to the foundry floor—it was the foundry floor for which the instrument was intended.

Vote of Thanks

MR. BALME (Branch Junior Vice-President), proposing a vote of thanks, said that the best tribute he could pay to Mr. Tucker was that he had made his subject so simple and easy to understand.

MR. W. ANDERSON (Member of Branch Council) seconded the vote of thanks. He had spent a very interesting and entertaining evening, made more so by Mr. Tucker having brought the apparatus to the meeting.

After Mr. Tucker had responded, the chairman closed the meeting.

"WHEELCO COMMENTS," the house organ of Wheelco Instruments Company, of Chicago, Ill., U.S.A., in its March issue, illustrates and describes the heat-treatment plant of the George H. Porter Steel Tracting Company, of Cleveland.

CHARGING ELECTRIC STEEL AND OTHER FURNACES

(*Continued from facing page.*)

ing parts of the charging machine are situated above the framework level and are accordingly readily approachable. The driver has his post at one side of the machine and obtains an unobstructed view.

The Charging Bar

The charging bar in a forge handling machine or manipulator has, of course, several features not found in a box charger. In the first place, it is fitted with a grip gear, consisting of a heavy pair of tongs at the forward end with grips to suit the material to be handled, which are operated by a powerful hydraulic cylinder at the rear end. In order to maintain an active grip as compared with the action of merely obtaining the grip by closing the valve, an air-loaded plunger is placed in the pipe line. As soon as contact is made by the grips, the oil pressure rises, thus compressing the air and forcing oil into the plunger casing. On closing the valve, the plunger is urged forward, maintaining the active pressure required on the cylinder. In the case of forge manipulators, provision is also made for shock absorption by means of air pressure during the act of pressing or hammering the forging.

The mobile machines, as already mentioned, are driven from a point at one side, the controls being grouped to form a unit placed in a convenient position to the right hand of the driver. Steering of the machine, being hydraulically operated under control of a patented follow up valve, is so arranged that the angularity of the castor and the steering wheel agree in direction and amount, avoiding any tendency to wander.

Generally speaking, mobile charging machines and manipulators are made in any capacities provided that sufficient space for their free movement is available. They are equally applicable to the handling of the lightest forgings, such as axles, shafts, coupling rods and various other workpieces.

THE UNITED STATES STEEL EXPORT COMPANY announces that the Clairton works of the Carnegie-Illinois Steel Corporation, Pittsburgh, Pa., a United States Steel Corporation subsidiary, have produced 70,000,000 tons of steel since Pearl Harbour.

IT IS AUTHORITATIVELY STATED that the Union of South Africa has produced a high percentage of 0.303 ammunition of the British Empire. It is making 100,000 practice bombs per month and is second only to Britain in the Empire production of 1,000-lb. demolition bombs.

A COMPLETE SUBJECT and author index of all the metals literature published during the past year is being prepared by the library of Battelle Institute, Columbus, Ohio, for the American Society of Metals. It will be included in the bound volume of the A.S.M. Review of Metal Literature for 1944.

CHARGING ELECTRIC STEEL AND OTHER FURNACES

MOBILE FLOOR UNITS

The charging of electric steel furnaces may be performed either by skips, containing the charge of metal, carried by an overhead crane or by loading the scrap through doors in the sides of the furnace. Electric steel furnaces with side doors have, if of large capacity, hitherto been charged by means of overhead machines or chargers running on rails placed on the platform. Smaller furnaces have for the most part been charged by hand. This is a laborious and time-taking process, involving loss of heat, particularly if the scrap metal to be handled is light and of irregular formation. In order to accomplish furnace charging quickly, mobile-type box chargers have been developed and successfully employed in many works.

These run on the platform, picking up the charging boxes from stands placed at convenient points. For this purpose the charging machine is provided with a tee-headed bar, which is carried in a rocking frame, provided with trunnions and rocking hoist gear as well as a locking bar to secure the charging boxes. An illustration of a machine of this type built by the Wellman Smith Owen Engineering Corporation, Limited, London, is shown in Fig. 1. From the illustration it will be seen that the machine is carried on three points, the front wheels being mounted on a through-going axle. The rear end is carried on a castor which constitutes the driving and steering element. This castor is provided with dual solid - rubber - tyred wheels, and is driven by an electric motor. It is capable of turning about a vertical kingpost through an angle of 90 deg. on each side of the central position.

Minimum Turning Radius

It will thus be seen that this permits of a minimum turning radius equal to the wheel base of the machine, and it is therefore capable of manœuvring in a comparatively small space. The rocking hoist motion may be operated either electrically or hydraulically, but the bar turning gear is arranged for hydraulic operation only. A constantly running motor and oil pump supplies the hydraulic power, giving the advantage of a reduction in the stored energy of the moving parts as compared with separate electric drives, thereby effecting a saving in the starting and stopping movements. Furthermore, the parts incorporated in the drive are small in bulk, which is a feature of importance.

Choice of Power

The mobile charging machine may pick up its current supply either through a flexible cable and drum or by means of a trolley pole with collectors running on an overhead track, whichever may be found the more convenient. Machines may also be built for operation by means of oil engines, making them independent of any electric current supply. In actual service it is found that the mobile charging machine materially reduces the time required for charging a furnace as compared with hand charging. This in turn means that the output of the furnace charged is increased and a saving in man-power is effected. The machine may be equally well employed for the charging of the smaller sizes of open-hearth steel furnaces, also cupolas.

Mobile billet, bloom, ingot and slab charging machines and also forge manipulators, generally based on similar lines to the box charger, are also finding increased employment, and may be used for handling steel or non-ferrous metals. They are mounted as before on three points, a dead front axle and a driving and steering castor. The latter has, however, an axle pivoted at its centre to the lower end of the kingpost, and the wheels are spaced apart, permitting employment of a dual motor drive. With the two motors wired in series, no differential gear is required and the gears are simple in design and easy of access. This type of castor has the further advantage that, owing to the fact that it is symmetrical in form, it requires the least possible space and enables the side frames to be carried outside and as low as ground clearance permits. With a low chassis, practically all the work-

(*Continued on facing page.*)

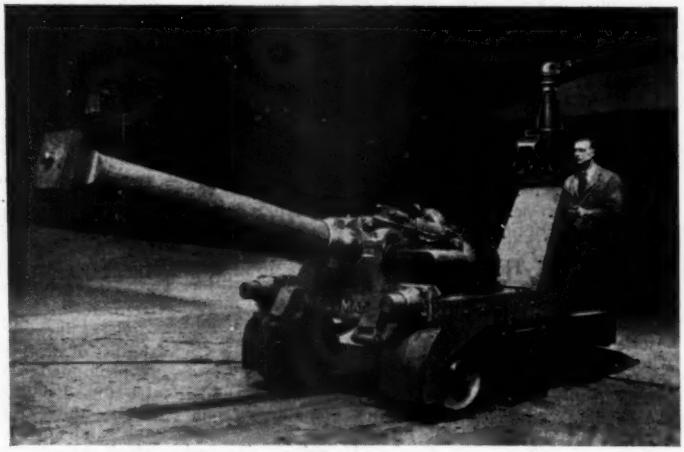

FIG. 1.—WELLMAN FLOOR-TYPE MOBILE CHARGER.

EXPORT CONTROL RELAXED

STEEL FOR THE COLONIES

The Export of Goods (Control) (No. 3) Order, 1945,* came into operation last month, and makes relaxations in the control of exports. Certain iron and steel products are among the goods affected by the Order.

The following items have been removed from the Schedule to the Export of Goods (Control) (No. 10) Order, 1943, and consequently require licences only when exported to those destinations† to which the export of *all* goods is controlled:—Magnesium and manganese; certain items of furnishing hardware and ironmongery; silica ware, scientific.

The following amendments have been made to the Schedule to the Order:—

Group 5.—The item "Refractory blocks, bricks and tiles of chromite, chromite-magnesite, dolomite, magnesite and silica" has been deleted and the following substituted:—Refractory blocks, bricks and tiles of silica.

Group 6 (1).—The item relating to aluminium and alloys mainly thereof has been deleted and replaced by:—Aluminium and alloys mainly thereof in the form of billets, blocks, blooms, cakes, grains, granules, ingots, leaf and foil in all forms (whether or not backed with other materials), lumps, notch bars, pellets, powder (other than flake), shot, slabs, sticks and wirebars.

The heading relating to non-ferrous metals and alloys thereof has been amended to exclude alloys mainly of aluminium, magnesium, manganese and mercury.

Group 6 (2).—The item "Cocks, taps, traps and valves for controlling gases, liquids and vapours" has been deleted from under the heading relating to manufactures wholly or mainly of non-precious metal and inserted under the heading relating to manufactures wholly or mainly of non-ferrous (other than precious) metal.

The following amendments apply to items under the heading "Manufactures wholly or mainly of non-precious metal":—

The item "Boot and shoe studs, spikes, tips and protectors" has been deleted and the following substituted:—Boot and shoe studs, hob nails, spikes, tips and protectors.

The item "Nails (including hob nails) and tacks" has been deleted and the following substituted:—Nails and tacks, the following: Wire nails; cut nails and tacks, not exceeding 1½ in. in length.

Export licensing control has been removed from the goods specified at (*a*) below, when exported to the destinations listed at (*b*).

(*a*) Iron and steel (including alloy steel) in the following forms, but not including goods specified in any group in the First Schedule to the Order other than Group 6 (1):—Angles, shapes and sections, whether fabricated or not, including hollow mining drill steel, but not including machinery parts; bars and rods, including hollow mining drill steel, but not including wire rods of 0.200 in. or more in diameter in coils; blooms, billets and slabs; girders, beams, joists and pillars, whether fabricated or not; hoop and strip; ingots; plates and sheets of all kinds of a thickness of ¼ in. or over; tubes, pipes and pipe and tube fittings; barbed wire; single-strand wire (uninsulated), but not including such wire of 0.200 in. or more in diameter in coils; colliery arches and pit props; bolts, whether threaded or not, bolt ends, set screws and screw studs, and other screws for metal, and nuts, whether tapped or not (including washers assembled with any of these articles); screws for wood, including coach screws, screw eyes, screw hooks, screw rings and screw knobs; railway and tramway material, the following:—Points, switches and crossings, chairs, fishplates and soleplates, tie bars and rail brakes; wheels, tyres, and axles; wire netting, wire fencing, wire mesh, wire cloth and gauze.

(*b*) Aden (Colony and Protectorate), Bahamas, Barbados, Bermuda, British Guiana, British Honduras, British Solomon Islands Protectorate, Ceylon, Cyprus, Falkland Islands and Dependencies, Fiji, Gambia (Colony and Protectorate), Gibraltar, Gilbert and Ellice Islands Colony, Gold Coast, Jamaica (including Turks and Caicos Islands and the Cayman Islands); Kenya (Colony and Protectorate), Leeward Islands, Malta, Mauritius, New Hebrides, Nigeria, Northern Rhodesia, Nyasaland Protectorate, St. Helena and Ascension, Seychelles, Sierra Leone (Colony and Protectorate), Tanganyika Territory, Tonga, Trinidad and Tobago, Uganda Protectorate, Windward Islands, Zanzibar Protectorate.

The following countries have been removed from the list of destinations to which the export of *all* goods is prohibited:—Union of Soviet Socialist Republics; Turkey, including the Hatay; Rio de Oro.

The above refers to *export licensing* requirements only and does not in any way affect the regulations which may be in force governing the *manufacture* of goods, including manufacture for export.

*S.R. & O., No. 357.

†The following are the destinations for which licences are required for *all* goods:—Andorra, Burma, China, Liechtenstein, Portugal (including Madeira, the Azores and the Cape Verde Islands), Spain (including the Canary Islands and the Spanish Zone of Morocco), Sweden, Switzerland, Tangier Zone, and Enemy Territories.

B.C.I.R.A. ELECTS NEW MEMBERS

The following companies have been elected ordinary members of the British Cast Iron Research Association. The name of the representative is given between brackets:—Anderston Foundry Company, Limited, Middlesbrough (Mr. G. D. Cunningham); James Cotterell & Sons, Limited, Walsall (Mr. B. Ball); Engineering and Water Supply Department, Adelaide (Mr. R. J. Wilton); Joseph Evans & Sons (Wolverhampton), Limited (Mr. T. G. Baxenden); and Mangold Bros., Limited, Port Elizabeth, Cape Province (Mr. W. J. Wallis).

Foundry Plant & Machinery, Limited, Glasgow (Mr. J. Affleck, B.Sc.), has been elected a trade member.

THE INSTITUTE'S TECHNICAL ACTIVITIES

DISCUSSION AT LONDON BRANCH MEETING

MR. A. LOGAN, the London branch representative on the Research Council of the Institute of British Foundrymen, discussed the technical work of the Institute at the annual general meeting of the branch held recently. He described the reconstitution of the former technical committee into the present technical council, discussed the manner in which it did its work, and indicated the matters under consideration. (The work of the technical council is to be the subject of a report to be presented to the Institute's annual convention next month.) Mr. Logan's survey was purely of an informal and interim character, so that the branch members could maintain their interest in the work, and perhaps might be able to offer assistance themselves.

One of the matters in connection with which offers of assistance would be welcomed, he said, was a proposal that there should be a new standard form of A.I.D. aluminium test-bar, which was actually being tried out. It was put forward originally as a bar for the alloy 309 only, but there was a proposal that it might be suitable for all aluminium alloys. The Institute was co-operating in the development work, and it was hoped that as many founders as possible would try it out.

MR. JAMES HALE (works manager, Robert W. Coan, Limited) said he would be pleased to give assistance in the development of the new test-bar.

MR. V. C. FAULKNER, who recalled that he had been largely responsible for the formation of the technical council, for he had suggested that the Institute should emulate the American Foundrymen's Association in regard to technical work, said that in general he was very pleased with the progress that had been made. But he was rather worried about the proposed publication of an "Atlas of Defects." The original idea with regard to the atlas, he said, was to ensure that all foundrymen would speak the same language, and that was worth doing. But he felt that the publication of a series of pictures illustrating various defects, with explanations as to how they were caused and how they were overcome, would not get us anywhere, because it was not fundamental information.

Aim of the Atlas

MR. LOGAN said there was probably some misunderstanding with regard to the atlas. It had been found by experience that founders did not always agree as to what they called certain typical flaws or faults or defects in castings, and the idea was to ensure that everyone would speak the same language about the same type of fault. The aim had been to provide pictures of certain defects which were unmistakably what they were represented to be, and which everybody would recognise as such, and to define them. There would be no attempt to say how they were caused and how they could be overcome; that would be too definite, and he did not think it would be possible.

The BRANCH-PRESIDENT (Mr. J. F. Kayser) was concerned about the wisdom of publishing the atlas. A buyer of castings might find it very amusing, when he bought a casting, to examine it very carefully with the camera and X-rays and to return it to the maker, contending that it possessed every single defect listed in the atlas; therefore, it must be a bad casting. The branch-president was afraid of the use of the word "defect" at all. The atlas would not be a private issue; in the first place it might be sent only to the members of the Institute, but eventually it would be broadcast all over the world. A buyer might contend that a batch of castings he had bought contained, for example, "defect No. 14," and he might send all the castings back to the makers. He urged that the technical council should be very careful about that aspect, and asked if it would be possible to eliminate reference to "defects" or "faults." Indeed, he recalled a case in which a buyer of castings had complained about defects; he had photographed the defects in his castings, and had actually compared them with photographs of defects which had been published previously in a journal.

Further, the branch-president suggested that, if the atlas were to be published, there should not be a rush to get it into print at the moment, in view of wartime difficulties. The photographs should be the very last word in perfection; and he was a very keen critic of photographs which were not in focus. Commenting on the investigation which was to be made by the technical council into the surface finish and dimensional tolerances of castings, he said that although Mr. Logan had mentioned sand castings and permanent mould castings, there was apparently no reference to the lost-wax process. He urged that that should be studied, for it produced small castings to an accuracy of $\pm$ 1½ thousandth of an inch. It would not be a good thing to publish a report in which the dimensional accuracy of the very best casting was $\pm$ $\frac{1}{16}$ in.

Photographs of Defects

MR. LOGAN suggested that surely it was a quibble to question the use of the word "defects"; after all, defects were defects, whatever else one liked to call them. The photographs which would be published would show defects which were quite typical and about which there could be no doubt. Even experienced foundrymen did not always agree about the same defect.

The BRANCH-PRESIDENT commented that he would prefer to call them "casting phenomena."

MR. LOGAN, referring to the work on surface finish and the suggested inclusion of the lost-wax process, said the committee concerned was confining its attention at the moment to sand castings; and permanent mould and other forms of casting would probably be tackled later. However, he would pass on the branch-president's remarks to the chairman of the technical council. No doubt there was quite a future for the lost-wax process.

The Institute's Technical Activities

MR. V. ELKINGTON, emphasising the remarks of the branch-president with regard to defects, said that iron-founders obviously wanted to know the causes of defects in castings. But if the atlas of defects was sent to him in his capacity as a chartered civil engineer, he would be tempted to examine the castings he bought for the defects which were illustrated. As a reasonable man he would probably say that many of the so-called defects did not render a casting unfit for its purpose. But there were many unreasonable inspecting engineers, who would condemn castings if they could find the slightest justification. If the atlas could be published confidentially, only to the members of the Institute, well and good.

The BRANCH-PRESIDENT could not see how the members of the Institute could keep it to themselves.

MR. G. MANN suggested that perhaps the atlas would do something to educate people as to the meaning of the word "defect." It would not lead an intelligent inspector to condemn a casting; but it might help to educate inspectors. Therefore, if the publication included a statement as to what was meant by the word "defect," it should serve a very useful purpose. With regard to the investigation into surface finish, he asked if that covered the subject of metrology, or whether it was concerned with surface finish from the point of view of shot-blasting or surface peening.

MR. LOGAN said he presumed it meant the degree of finish which would be produced when using different types of sand, and the committee concerned might define surface finish by assessing it in a particular way. It would have some relation to dimensional accuracy.

Research Facilities

MR. E. W. HARDING asked where and by whom the necessary research was being carried out.

MR. LOGAN replied that the Institute had no direct research facilities available, and no investigation was proceeding beyond that which could be done in the foundries of the members. There was a very small fund, which would not go far in that direction. The work was done in the foundries more or less by the courtesy of the managements.

MR. FAULKNER referred to specific cases in which work was being done within the organisations of the firms in which members were employed, and said that some of the largest firms in the country were allowing their metallurgists to co-operate in the work of the technical council.

MR. LOGAN, referring to the investigation into the proposed new standard aluminium test-bar said that patterns could be obtained on loan by application to Mr. J. Bolton, acting secretary of the Institute.

MR. FAULKNER, replying to a question as to informing members about the work of the technical council, said it was the intention that a quarterly statement would be put to the branches.

(*Continued at foot of next column.*)

NEW PATENTS

The following list of Patent Specifications accepted has been taken from the "Official Journal (Patents)." Printed copies of the full Specifications are obtainable from the Patent Office, 25, Southampton Buildings, London, W.C.2, price 1s. each.

567,191 ABBEY, A. (Dewey & Almy Chemical Company). Fusible blanket compositions for covering molten zinc in galvanising.

567,221 SKLENAR PATENT MELTING FURNACES, LIMITED, and WILLIAMS, W. Reverberatory furnaces.

567,268 WALLWORK GEARS, LIMITED, and TAIT, W. Foundry moulding machines.

567,279 FITZMAURICE, G. G., HULL, F. J. K., and GRAHAM, A. J. W. Metal railway sleepers.

567,304 ELECTRIC FURNACE COMPANY, LIMITED (Ohio Crankshaft Company). Method of and apparatus for hardening metallic articles.

567,308 BROADHURST, H. M., and IMPERIAL CHEMICAL INDUSTRIES, LIMITED. Casting of rare earth metals.

567,330 BRISTOW, B. C. Apparatus for manufacturing piston rings.

567,349 O'SHEI, W. E. Die casting or the like.

567,355 WELLMAN SEAVER ROLLING MILL COMPANY, LIMITED, and SMITH, S. Tube-swaging machines.

567,388 SOC. ANON. POUR L'INDUSTRIE DE L'ALUMINIUM. Manufacture of hollow bodies of metal.

567,389 RICHARDSONS, WESTGARTH & COMPANY, LIMITED, DORRAT, J. A., and HUNTER, H. Manufacture of boilers and the like.

567,486 DARWINS, LIMITED, and LINLEY, A. Foundry moulding boxes.

567,487 DARWINS, LIMITED, and LINLEY, A. Foundry sand moulds.

567,489 TELEPHONE MANUFACTURING COMPANY, LIMITED, and PADDLE, L. H. Production of metal alloys and alloy powders.

(*Continued from previous column.*)

MR. LOGAN said it would be the duty of the branch representative on the technical council to give a *résumé* of the work of the technical council.

MR. G. R. WEBSTER (branch vice-president) suggested that, when interim reports were given on the work of the technical council, there should also be statements on the work which it was proposed to do in the future, so that any of the members of the branches who felt that they could help would have the opportunity to offer their services.

THE BRANCH-PRESIDENT said that, although the technical council had very little actual funds to use for financing research, it would be right to say that it had facilities available worth, say, a million pounds, for many of the firms which were co-operating were exceedingly opulent and had magnificent research laboratories.

On the motion of Mr. Elkington, the meeting accorded its thanks to Mr. Logan for his review of the work of the technical council.

More work from your STEAM

Practical Ideas for better steam usage

HAVE YOU REALISED that the shrewd and enterprising use of steam brings not only urgently needed fuel economies but often a great improvement in production efficiency of steam-using plant? • Steam is very obliging stuff. The better you understand and handle it, the more work it will do for you. • Below is a list of Bulletins written by experts and packed with practical suggestions. Put these suggestions into use and you will (*i*) save fuel; (*ii*) improve plant efficiency and output; and (*iii*) put in some really good groundwork for post-war economy of production.

CORRECT METHODS OF CONDENSATE AND AIR REMOVAL (*Bulletin No.* 3)

Economy of steam consumption and speed of output so very often depend largely on the proper discharge of condensate and air from the steam-using plant. This Bulletin is a valuable guide to the choice of steam traps and the best methods of air venting.

HOW TO MAKE THE BEST USE OF CONDENSATE (*Bulletin No.* 4)

Condensate discharged from steam traps is not by any means waste water. It is hot and soft and clean, and there are many excellent uses for it. Read about condensate and how to deal with it.

UTILISATION OF STEAM (*Bulletin No.* 22)

This is a really handy and all-round guide to the intelligent use of steam for space heating and process work. Economy ideas on practically every page; easily and quickly put to use.

THE SENSIBLE USE OF LATENT HEAT (*Bulletins Nos.* 18 *and* 19)

The Latent Heat of steam is its *readily usable* heat. How best to use it and re-use it is told in this Bulletin.

FLASH STEAM AND VAPOUR RECOVERY (*Bulletin No.* 28)

You should know how to put flash steam and process vapour to work in place of live steam. This Bulletin points the way to substantial economies.

THESE BULLETINS should be read closely by every steam user. The steam savings they describe are permanent gains and sound business propositions. Copies of the booklets are free from your Regional Office of the Ministry of Fuel and Power.

ISSUED BY THE MINISTRY OF FUEL AND POWER

NEWS IN BRIEF

THE T.U.C. HAVE INFORMED the Minister of Labour that after further consideration they reaffirm their opposition to any labour controls during the period between the end of the German war and the end of the war with Japan which carry sanctions of fines or imprisonment.

AT THE RECENT ANNUAL MEETING of the Titanium Pigment Manufacturers' Specification Committee, Mr. W. A. Cash, of British Titan Products Company, Limited, was elected chairman, and Dr. A. N. C. Bennett, of National Titanium Pigments, Limited, as secretary for the coming year.

JOHN SHAW & SONS, WOLVERHAMPTON, LIMITED, have purchased the whole of the issued capital of Moore & Wright (Sheffield), Limited, and its associate company, the Avia Steel & Tool Company, Limited, at a cost of £115,000. Moore & Wright are manufacturers of precision and measuring hand tools.

MR. A. J. SHIMWELL, a Johannesburg merchant, has left £3,000 to Birmingham Central Technical School in appreciation of the benefits he received under a scholarship some 50 years ago. He ordered that the money be used for a Shimwell scholarship to assist youths entering the metal trade.

THE SHARE CAPITAL in John Fowler & Company (Leeds), Limited, formerly owned by the Ministry of Supply, has been sold to Rotary Hoes, Limited, agricultural machinery manufacturers, of East Horndon, Essex. It has been agreed that the factory should be used firstly to supply the needs of the home market for agricultural machinery, and secondly to develop the export trade.

IT IS PROPOSED to increase the capital of Cochran & Company, Annan, Limited, boilermakers, by £50,000 in 5 per cent. cumulative preference shares of £1 each, to be offered to holders of the present capital (£150,000 in ordinary shares) at par in proportion to their holdings. Consent of the Treasury has been applied for, and provisional arrangements have been made for guaranteeing the issue.

THE "NEWER HEAT EXHIBITION," to demonstrate the great advances in the design of solid-fuel-burning appliances for domestic heating, cooking and hot-water supply brought about by recent research, will be held at the Building Centre, Conduit Street, London, W.1, from June 1 to 30. It has been organised by the Coal Utilisation Joint Council and will be open to the public on week-days from 10 a.m. to 7 p.m.

AN AGREEMENT has been reached providing a general wages advance in the shipbuilding and ship-repairing industry. The agreement gives a war bonus advance of 4s. 6d. for a 47-hr. week to male employees of 21 and over—time and piece workers—from the beginning of the first full pay week this month. The advance is to apply to men whose wages fluctuate with shipbuilding and ship-repairing wages, but not to men whose wages fluctuate with those in other industries.

THAT IT WOULD BE economically unsound for New Zealand to put down steel plant to meet her small requirements when products were readily available for import from Sheffield is a statement attributed to Mr. S. G. Holland, leader of the Opposition in the New Zealand Parliament, and Mr. F. W. Doidge, New Zealand's deputy speaker, who visited Sheffield recently. They are in this country studying many aspects of national life and investigating the possibilities of inter-Empire trade.

WELLINGTON (SALOP) URBAN COUNCIL had before them recently plans prepared by a firm of sheet metal workers for the erection of a factory in Glebe Street. The Housing and Town Planning Committee had recommended that because it was not in conformity with the proposed area joining the plans should not be approved. Several councillors regretted the committee's action, and suggested that the plans should be approved, but the committee's recommendation was eventually adopted.

OBITUARY

MR. FRANK DUNNING BOULTON, of Newcastle, Staffs, has died at the age of 70. He was chairman of William Boulton, Limited, Providence Engineering Works, Burslem.

MR. C. W. DIXON died on May 3 at Haslemere, Surrey, aged 81. He was a member of the Birmingham firm of H. W. Ward & Company, Limited, machine-tool makers.

MAJOR T. G. BIRD has died at Jesmond Park West, Newcastle-upon-Tyne. He was managing director of Armstrong Whitworth & Company (Pneumatic Tools), Limited, Jarrow Engineering & Shipbreaking Company, Jarrow Metal Industries, Limited, and of Sir W. G. Armstrong Whitworth & Company (Iron-founders), Limited.

MR. ALFRED MARTIN, manager of the constructional department of Dorman, Long & Company, Limited, at Middlesbrough, died in tragic circumstances on Friday, May 4, almost on the eve of his transfer to succeed Mr. Cecil Hipwell as manager of the company's London constructional department. Mr. Martin was selected as chief assistant to Mr. Laurence Ennis, late managing director of Dorman, Long, when Mr. Ennis was given charge of the construction of the Sydney Harbour Bridge.

MR. JOSEPH HEPWORTH, M.P. for East Bradford, and a past-president of the Institute of British Foundrymen, died at Bradford on May 11, aged 68, after protracted illness. Mr. Hepworth was a founder and joint managing director of Hepworth & Grandage, Limited, manufacturers of pistons, piston rings, etc., of Bradford, until he retired in 1933. In 1936, he became chairman and managing director of the Bradford Piston & Piston Ring, Company, Limited. He was president of the West Riding of Yorkshire branch of the Institute of British Foundrymen in 1936 and 1937, and president of the Institute in 1938. Mr. Hepworth was a member of the Engineering Advisory Committee to Bradford Technical College. He had represented East Bradford in the House of Commons since 1931.

What is the maximum thickness of Iron or Steel that can be cut with OXYGEN?

Nobody has yet produced a piece of iron or steel so big that an oxygen flame-cutter cannot go through it with speed and accuracy. This heavy Diesel bed plate was to be scrapped. It weighed 85 tons, far too big to be handled in one piece. The B.O.C. Technical Service Department was asked to direct the job and in an amazingly short number of hours, it was cut into pieces suitable for transport—all by the use of the oxygen flame-cutter.

Oxy-Acetylene equipment should be carefully maintained to retain high efficiency and should be sent to the B.O.C. periodically for examination and overhaul.

THE BRITISH OXYGEN COMPANY LIMITED

LONDON & BRANCHES

COMPANY RESULTS

(Figures for previous year in brackets.)

Allen West—Net profit to January 31, £50,197 (£49,874); to general reserve, £15,000 (same); dividend of 7½%, £36,563 (same); forward, £60,738 (£62,104).

Ransomes, Sims & Jefferies—Net profit for 1944, after depreciation, A.R.P., E.P.T., and deferred repairs, £43,116 (£47,314); ordinary dividend of 7½% (same); forward, £62,724 (£58,858).

Quirk, Barton—Profit on trading and income from investments for 1944, £8,810 (£8,598); taxation, £2,300 (£2,600); depreciation, £1,750 (same); final dividend of 6%, making 8½% (same); forward, £19,564 (£19,685).

Smith & McLean—Profit, after providing for depreciation, taxation, bad and doubtful debts, war damage insurance, etc., £51,475 (£56,300); ordinary dividend of 11% and a bonus of 4% (same); forward, £97,862 (£74,512).

William Beardmore & Company—Net profit for 1944, £177,345 (£189,668); cumulative preference dividend, £26,125; to war contingencies reserve, £100,000; final dividend of 7% on the ordinary stock, making 10% (same); forward, £254,262 (£250,542).

Newman Industries—Net profit, £82,652 (£70,978); tax, £52,250 (£41,000); dividend on the redeemable preference shares, £6,000 (£5,370); preferred dividend, £1,800 (same); final ordinary dividend of 12½%, plus a bonus of 2½%, making 22½% (20%); forward, £20,366 (£18,014).

Stewarts and Lloyds—Net profit for 1944, after charging E.P.T., income-tax, war damage and £127,500 for debenture interest and redemption, £1,989,836; depreciation, £624,612 (£638,609); reserved for obsolescence, £500,000; dividends on the preference shares, £121,202; dividend of 12½%, less tax at 9s. 10d., on the deferred stock, and at the same rate relatively on the liaison deferred shares, £534,050; forward, £254,299.

Johnson & Phillips—Profit for 1944, £458,402 (£510,224); net profit, £180,325 (£139,873), after debenture interest, £41,663 (£41,999) for depreciation, £13,382 (£9,925) for pensions, group life assurance, etc., £2,240 (£2,499) for men serving in the Forces, £180,000 (£280,000) for tax provision, and £20,698 (£10,406) for A.R.P.; final dividend of 7½%, making 15% (same); forward, after £25,000 (£15,000) for research and development, and £80,000 (£30,000) for special reserve for contingencies, £108,340 (£93,015).

Babcock & Wilcox—Manufacturing profit for 1944 and dividends from subsidiary and associated companies, £747,342 (£714,532); available with miscellaneous receipts, £831,733 (£789,026); balance after providing for fixed charges and Dominion and foreign taxation, contributing £50,001 (£48,446) to staff pension funds, providing £25,000 (same) for possible fall in value of stock and merchandise, £1,514 (£4,682) for war damage insurance and £65,000 (nil) for E.P.T., £647,214 (£638,583); provision for E.P.T. for previous years not required, £28,776; United Kingdom income-tax, £395,530 (£362,333); a total distribution on the ordinary stock for the year of 12%; forward, £137,380 (£131,224).

PERSONAL

MR. E. C. HOLROYDE, joint managing director of Crompton Parkinson, Limited, has been appointed chairman of the British Electrical and Allied Manufacturers' Association.

SIR JAMES S. PRINGLE, late Director of Electrical Engineering, Admiralty, has undertaken, with the permission of the Admiralty, to act in an advisory capacity to the Metropolitan-Vickers Electrical Company, Limited.

MR. K. G. LAMPSON has been appointed Deputy Controller of Iron and Steel Supplies in succession to MR. A. G. E. BRIGGS. The Minister of Supply has agreed to release Mr. Briggs as from April 30. His services will continue to be available in an advisory capacity.

MR. FELIX LEVY, a director of George Cohen, Sons & Company, was seconded in September, 1939, to the Ministry of Supply, where he has been Assistant Director of Scrap Supply. It is announced that the Controller of Iron and Steel has agreed to Mr. Levy's release. From now on he will devote his time to the administration of George Cohen, Sons & Company, Limited, and their associate companies.

MR. J. D. STITT, at his own request, is relinquishing his position as managing director of Redpath Brown & Company, Limited, structural engineers. He is remaining on the board of the company, and also retains his directorship of Dorman, Long & Company, Limited. Mr. Stitt joined Redpath Brown & Company as a boy; he has been managing director for 20 years. MR. CECIL HIPWELL, manager of the Nine Elms, London, constructional works of Dorman, Long & Company, Limited, has been appointed general manager of Redpath Brown & Company, Limited, and commenced his new duties on May 14. A native of Bradford, Mr. Hipwell has had 30 years' service with Dorman, Long, being closely associated with the development of steel erection as a major activity of the company. During the building of the Sydney Harbour Bridge he was erection superintendent. Mr. Hipwell was greatly concerned with the invasion harbours project, being in charge of the executive direction of the contract entrusted to Dorman, Long for the completion of the "whales," or pierhead equipment.

MIDDLESBROUGH PIPE WORKS REOPENING

Cochranes (Middlesbrough) Foundry, Limited, announce the early reopening of their plant at Cargo Fleet, Middlesbrough, for the manufacture of spun-iron pipes. Originally established in 1936, this plant, which has been closed since December, 1940, comprises five cupolas, six spinning machines, and one normalising furnace. Capacity output is stated to be not less than 40 miles of pipe per week, ranging from 3 in. to 24 in. in diameter and up to 21-ft. lengths. The initial resumption of work will not be on a full scale, but substantial orders are in hand or in sight, and it is expected that employment will be provided for about 130 hands.

Patch

WORN FURNACE BRICKWORK WITH

Durax No. 1

PLASTIC FIREBRICK COMPOSITION

BEFORE

...AND AFTER

WHEN quick repairs to worn furnace brickwork are required, Durax No. 1 provides an excellent patching medium. It is supplied in a stiff, plastic condition ready for use. It possesses exceptionally high refractoriness, negligible shrinkage on drying, and good resistance to thermal shock.

Durax No. 1 is also frequently used as a rammed monolithic lining in small size furnaces, such as crucible furnaces, owing to the ease of installation — the avoidance of special shapes—and because it provides a strong, durable structure. Users who require further information concerning the uses of Durax No. 1 should communicate with the G.R. Technical Department.

General Refractories LIMITED

GENEFAX HOUSE, SHEFFIELD, 10

37 TELEPHONE: 31113 (6 LINES)

FIREBRICKS · BASIC BRICKS · ACID-PROOF MATERIALS · CEMENTS

PLASTICS · INSULATION · SILICA BRICKS · SILLIMANITE · SANDS

Raw Material Markets

IRON AND STEEL

Under official direction, a remarkably even balance is maintained between the supply of and demand for pig-iron. Some of the foundries would welcome bigger allocations of high-phosphorus iron, but, on the whole, production just about suffices for current needs. There are, of course, other blast furnaces which could be put into operation at short notice, but this would involve further encroachments upon coke supplies, which are scarce. The Ministry is taking care that the blast furnaces do not run short of coke, but the foundries are less favourably situated and all consumers of metallurgical coke are still in ignorance of the price they will have to pay for current deliveries. When the advance of 3s. 6d. in coal prices was announced, no decision had been reached regarding foundry and blast-furnace coke, and suppliers have had to notify their customers that any advance will be retrospective as from May 1.

Maintenance of maximum outputs at the sheet mills involves a high consumption of sheet bars and some of the steelworks are finding it difficult fully to meet this demand and at the same time maintain their deliveries of small billets, etc. There is consequently a well-sustained demand for all classes of defective material suitable for re-rolling.

The improvement in the demand for sections and plates is maintained. There has been, in certain parts of the country, for some time, dislocation of traffic due to the wagon shortage and other reasons, resulting in large accumulations of rolled material at the steelworks, and some of the mills have been idle to allow the accumulations to be liquidated. There is still no sign of any large business developing for steel plates and sections from the shipbuilding industry. Other heavy trades are specifying more fully, but this does not mean that the plate mills are without anxiety; they need more orders for forward despatch, and the sectional mills would welcome business for heavy joists and sections.

NON-FERROUS METALS

The announcement that in future applications for licences to acquire copper and zinc for United Kingdom consumption will be considered by the Control without restrictions in respect of the type of article to be manufactured is a very welcome one to users of these two non-ferrous metals. It is true that the licensing procedure remains, but the relinquishing of all vestiges of control can hardly be expected at this early date. Aluminium has for some time been relatively free, and with these further relaxations of war-time regulations, users of non-ferrous metals are in a fair position to proceed with their plans for peacetime manufacture. There are snags yet, of course, not the least of which is the labour shortage. It may be expected, however, that the man-power position will from now on grow steadily more favourable. Lead, like copper and zinc, is in reasonably good supply, but how soon tin will be available in better quantities no one can say. Obviously, care in the use of tin will continue to be necessary both here and in the United States of America so long as the Far Eastern conflict continues. In America, the view has been officially expressed that it may be two years before large-scale shipments of tin or tin ore begin to arrive from the areas now held by the Japanese.

NEW COMPANIES

("Limited" is understood. Figures indicate capital. Names are of directors unless otherwise stated. Information compiled by Jordan & Sons, 116, Chancery Lane, London, W.C.2.)

W. J. Hooker, 73, Cotswold Gardens, London, N.W.2—Foundry supplies merchants. £1,000. W. J. and N. J. Hooker.

H. J. Anstee & Sons, 83, Dame Alice Street, Bedford—Ironfounders. £1,000. J. W., H. M., H. E., and C. W. Anstee.

Brit Engineering Company—£10,000. G. L. Lane, H. S. A. Bemister, and R. J. Boys, 3, Queens Park Road, Bournemouth.

G. F. Kerr (Engineers), 87, Trinity Road, Wood Green, London, N.22—£1,000. S. R. and E. E. Kerr and A. T. Holloway.

Ernest G. Adams (Stockport), 19, Baker Street, Heaton Norris, Stockport—Engineers, etc. £5,000. E. G. and A. Adams.

Maysmith Engineering Company, 290a, High Road, Willesden Green, London, N.W.10—£2,000. F. E. Smith and P. F. May.

Darlington Engineering Company (Gateshead), Queensway, Team Valley Trading Estate, Gateshead. £6,000. R. H. Kirkup.

Alexander Higgins & Sons, The Hayes, Lye, near Stourbridge, Worcs—Engineers, etc. £8,000. G. H., A. H., and E. Higgins.

Wisehill, Field & Company, 38, Bridge Street, Andover—Engineers. £2,000. A. E. Wisewell, J. A. Hill, and J. W. Fletcher.

H. A. B. & Company, 45a, Manor Road, West Ealing, London, W.13—Engineers. £2,000. N. W. Harris and E. H. Bonney.

Kingsland Die-casting Company, 87, Trinity Road, Wood Green, London, N.22—£1,000. S. R. and E. E. Kerr, and A. T. Holloway.

Lune Metal Spinning Company, The Close, Queen Square, Lancaster—£5,000. A. W. Senior, J. P. Pimbley, and T. B. Hustler.

G. E. Winyard, Moxley Road, Bilston, Staffs—To take over the business of the Station Engineering Company. £10,000. G. E. Winyard.

R. E. Ormerod, School Lane, Licky End, Bromsgrove—Engineers, ironfounders, etc. £3,200. R. E., R. A., F. C., and R. F. Ormerod.

Albert Marsh & Company, 57, Solly Street, Sheffield—Engineers, etc. £2,500. A. and I. M. Marsh, H. H. Butterworth, and C. J. Bailey.

Anderson & Homer, 86-88, Frederick Street, Walsall—Malleable and grey ironfounders. £12,000. W. A., A., N. W., and H. B. Homer.